Neither DIRECTV nor EchoStar currently operates an FSS satellite. Their satellites are BSS satellites, also known in the United States as DBS satellites. HNS and EchoStar do, however, make two-way broadband services available to their customers via FSS satellites, using capacity leased from PanAmSat and other FSS operators. The first HNS SPACEWAY satellite currently is planned to be launched in 2003. A further description of HNS's leased FSS capacity is discussed in response to interrogatory IX.B.1.

B. Explain in detail all changes in the control/independence of PanAmSat as a consequence of its proposed sale to EchoStar.

PanAmSat Corp. is a public company that is traded on the NASDQ market. Hughes (and affiliated companies) owns 80.6% of the issued and outstanding capital stock of PanAmSat. As a public company, PanAmSat maintains an independent Board of Directors that oversees the management of the company and is bound by their fiduciary obligations to the company and shareholders.

If the merger is approved and is consummated, New EchoStar will acquire the 80.6% of PanAmSat that is currently owned by Hughes and will become the majority shareholder of Panamsat. There will be no other structural difference between the pre-merger and post-merger independence of PanAmSat. The PanAmSat Board of Directors will continue to oversee the management of the company subject to their fiduciary obligations.

If the merger is not approved and is not consummated, pursuant to the terms of a Stock Purchase Agreement between Hughes and EchoStar, EchoStar will either (i) enter into an agreement pursuant to which EchoStar would acquire all of the issued and outstanding shares of PanAmSat common stock held by Hughes or (ii) EchoStar will commence a tender offer to purchase all (and not less than all) of the issued and outstanding shares of PanAmSat. After these transactions are consummated, EchoStar will be the majority and possibly sole shareholder of PanAmSat. To the extent that EchoStar purchases only the shares of PanAmSat held by Hughes, EchoStar will be in the same position as if the merger had been completed. If EchoStar acquires all of the issued and outstanding shares of PanAmSat, EchoStar will be the sole owner of PanAmSat.

The transition process regarding the transfer of control over PanAmSat has started with a recent initial meeting between the management of the two companies. No decisions have yet been made relating to the operations, control or independence of PanAmSat.

XII. Technical Questions

A. Is there an intent to aggregate control and uplink facilities?

The Applicants do plan to consolidate and/or aggregate the uplink facilities as well as backhaul facilities, to the greatest extent possible. This affords the opportunity to reduce costs, increase capabilities, and provide improved redundancy. However, the Applicants' "Local Channels All Americans" Plan, announced on February 25, 2002, requires a minimum of four uplink facilities – the total number of facilities that the two companies currently operate. In

addition, the plan creates the likelihood that a fifth uplink facility may be required in addition to the four existing locations the two companies currently operate. This fifth location may be needed to provide adequate site differentiation for the re-use of the uplink frequencies to achieve the greatest benefit from the spot capacity. So, while the plan will likely require additional uplink investment even for the combined company, the uplink infrastructure can be secured much more efficiently for New EchoStar, as the merged company can draw on a basis of 4 uplink centers.

There are two guiding factors regarding control of the combined facilities:

1) All of the facilities must be carefully coordinated in their planning and day-to-day operations. Particularly with spot beams, every location has the potential to be communicating with every satellite. This must be done in lock step with military precision.

2) Despite the requirement for total cooperation, New EchoStar must make significant provision for redundancy/backup. Each uplink facility must be prepared to instantly stand independent of the other facilities, delivering the maximum possible content in the event one or more of the other facilities is not functional.

B. What is the actual compression ratio in each system today? What are the maximum and minimum ratios used?

DIRECTV currently compresses its digital signals to achieve a compression ratio of SDTV programs per DBS transponder of approximately 10:1 for high-power DBS transponders. DIRECTV achieves an approximately 8:1 compression ratio for low-power DBS transponders. These compression ratios represent the level of compression that is achievable today while assuring minimally acceptable TV picture quality. The use of greater compression beyond these levels often results in unacceptable "digital artifacts," which can be very distracting to the viewer.

Recent upgrades to the software algorithms used by the compression systems did not achieve the anticipated levels of improvement expected. As a result, instead of achieving desirable video quality at the 10:1 compression level, the quality is only minimally acceptable. Based on these results, it is likely that the next major advance in compression software algorithms will not afford any additional channel capacity, but will instead afford the opportunity to restore picture quality to the levels that customers have come to expect.

Technological advances in the future may permit a compression ratio of 12:1 using existing hardware, while still preserving acceptable picture quality. At the present time, however, such performance is not possible for all types of TV programs, depending on their picture content. **[Redacted]**

C. Based on LYNGSAT it would appear that 12:1 compression is currently used on some transponders. If 12:1 is the current level, what is the future predicted level of compression?

Please see response to Interrogatory XII(B).

D. If the orbital slots of 32 channels become available, is it the intent of the operators to have a higher number of spot beams to increase capabilities? Is it your intent to build spot beam satellites in the future that will utilize the assigned 32 channels at a position?

On February 25, 2002, the Applicants filed an application for a new spot beam satellite to be launched by the combined firm, New EchoStar 1, which will operate in conjunction with DIRECTV 4S, DIRECTV 7S, EchoStar VII and EchoStar VIII. Together, these five spot beam satellites will provide the capability for a total of 28 spot beam frequencies spread across all three DBS CONUS orbital locations. New EchoStar will use this spot beam capability under the "Local Channels, All Americans" plan to carry local broadcast channels in the 210 DMAs across the country, along with necessary back-up and service expansion capabilities. This plan, which contemplates a mix of spot beam and CONUS capability at each DBS CONUS orbital location, represents the latest judgment of the Applicants as to the most effective way to provide local channel service nationwide, while rationalizing the use of the DBS spectrum and the satellite assets that each of DIRECTV and EchoStar have in orbit or under construction.

For a variety of reasons, New EchoStar believes that spreading spot beam satellites among the three CONUS orbital locations is a much superior alternative to using all 32 channels at one orbital location for spot beams. Spreading spot beam satellites among three CONUS slots will give New EchoStar flexibility and will allow it to match geographic areas of the country with the spot beam best situated to serve them. Even more important, this approach will allow New EchoStar to make better use of existing spot beam satellites, which, as explained in response to Request XII.F, cannot be moved between orbital locations without great loss of effectiveness. In sum, use of only one orbital location for spot beams would be inefficient and costly.

E. How many channel/transponders/spot beams/reuses do you estimate would be required, and with what compression ratio, for one satellite to serve all local-into-local from one location?

In the Applicants' view, there is no practical way to incorporate enough of the necessary components into a single satellite at a single location that warrants serious consideration from a feasibility perspective, for a number of reasons:

- There is a tremendous risk associated with consolidating as many services onto a single chassis as would be handled by such a satellite. It is not

feasible to provide for any form of redundancy in the event of catastrophic failure of the satellite.

- Such a satellite would require a vastly larger ground infrastructure to provide the physical site diversification and isolation. Cost and management of this infrastructure would be prohibitive.

- The cost of such a complicated satellite, unprecedented in the industry, cannot be warranted by the relatively small revenue generated by local channels in a given market, coupled with the need to sacrifice competitiveness and revenue from the national programming that will need to be displaced.

- Such a plan would be particularly inefficient given the firm's current investment in spot beam satellites, as a new satellite serving all DMAs with local-into-local service would supplant and make useless existing spot beam capability.

- The reliability of this complicated design is certain to be lower than more traditional configurations, which will translate directly into increased in orbit insurance costs.

- Overwhelming logistical problems, such as the eventual need for a swap-out of all subscriber equipment to accommodate 8PSK modulation, and the lack of adequate satellite redundancy to ensure an orderly transition from existing satellites and set-top boxes.

The Applicants also incorporate by reference the Declaration of Dr. Richard J. Barnett, attached as Exhibit B to the Applicants' February 25, 2002 Opposition and Reply Comments, which discusses additional reasons why such a single orbital location "super-satellite" is not feasible.

F. Can the present spot beam satellites be collocated?

The "Local Channels, All Americans" plan contemplates that the existing and planned spot beam satellites of EchoStar and DIRECTV will remain in their current orbital positions (EchoStar VII at 119° W.L. and DIRECTV 4S at 101° W.L.) or will be launched into their planned orbital locations (EchoStar VIII at 110° W.L. and DIRECTV 7S at 119° W.L.) and that a new spot beam satellite will be launched into the 110° W.L. orbital location.

Generally, it is technically possible to arrange the existing and planned spot beam satellites into some other configuration, including collocating all five satellites at one location. However, moving an existing or planned satellite from its currently-contemplated orbital location could result in less than optimal utilization of the combined company's resources. First, EchoStar and DIRECTV each designed their respective existing or planned satellites to utilize all or a portion of the frequencies licensed to the respective company at a

given orbital location. Thus, moving a satellite or satellites to different locations could result in overlapping frequency use, which would mean less overall available capacity for the combined firm. EchoStar VII and EchoStar VIII cannot be collocated and still provide useful spot beam operations. If one satellite is operating in the full spot beam mode (i.e. all 25 equivalent spot transponders in operation), the other satellite cannot utilize any spot transponders if at the same orbital slot. The second satellite can only operate over the remaining CONUS transponders.

Second, the spot beam coverage for each satellite is highly dependent on the geometry from the orbital location for which the satellite was originally designed. Thus, moving a satellite to a different orbital location would likely result in a misalignment of the spot beams for that satellite with the intended coverage area. This misalignment would likely result in unacceptable levels of interference between the spot beams due to distortion, and would therefore result in less available capacity.

G. Without the merger what can you do with current technologies to improve efficiencies?

Since inception of their services, both EchoStar and DIRECTV have implemented numerous techniques to improve the efficiency of their DBS systems in order to become more competitive, and to offer consumers more services and more value. Some of these efficiency-enhancing methods are currently being implemented as described in response to Interrogatories XII.B and XII.E. However, at present, each company is close to capacity. There is almost no practical way to substantially increase the amount of national and local programming (including new services) that EchoStar and DIRECTV can offer consumers in a manner that makes any business sense and that would be acceptable to each company standing alone.

Opponents of the merger have hypothesized several technologies that EchoStar and DIRECTV might implement in their view to increase stand-alone capacity. None of these proposals is practical from a business perspective.

Spot beam Satellites

Each of EchoStar and DIRECTV has invested hundreds of millions of dollars in spot beam satellites. These satellites allow scarce spectrum to be reused on a geographic basis, and therefore can effectively increase the available spectrum capacity, but only to the extent that different programming is demanded in different areas. Thus, at present, the primary practical use for spot beam DBS capacity is local-into-local programming.

On a stand-alone basis, each company's current and planned spot beam satellites will allow it to meet the must carry obligations and modestly expand primary local channel coverage. The exact number and identity of new DMAs to be served are not yet determined but will depend on several factors, including:

- The successful launch of the satellites and their ability to operate fully as planned without any limitations;

- The technical limits of planned spot beam satellites, including which DMAs the spot beams are pointed at and can serve effectively, and the channel capacity of each spot beam;

- The trade-offs between national and spot beam capacity, and the extent to which DIRECTV and EchoStar can each afford to give up actual or potential national capacity and therefore some competitiveness and revenues nationally in order to use that capacity to carry local-into-local programming;

- The ability of EchoStar and DIRECTV to negotiate retransmission agreements with those local broadcast stations that do not elect must-carry status;

- The on-the-ground costs of providing local-into-local service, which include the initial cost of equipment and installation in each DMA, as well as monthly costs, such as for high-capacity data lines from that location to the uplink center; and

- The number of consumers expected to subscribe to the local-into-local programming in each DMA, and expected revenues from them.

Notwithstanding the uncertainty associated with these factors, EchoStar expects that it will have the capability of offering local channel service in approximately 50 DMAs from its spot beam satellites, in light of its satellite architecture, economic feasibility considerations and estimated redundancy needs. Although the spot beams on EchoStar VII and VIII would have the physical capability of viewing additional DMAs (meaning all or a large portion of each DMA), that capability is meaningless: while the spot beams of EchoStar VII and VIII reach more DMAs, because of EchoStar's must carry obligations, there is insufficient capacity in those beams to carry all of the channels for all of the DMAs within their reception areas.

For its part, DIRECTV will have the capability of offering local channel service in 51 DMAs without dramatically reducing the carriage of other national programming using CONUS capacity. Assuming that DIRECTV 7S: (i) suffers no technical complications during construction and is not delayed; (ii) is launched successfully; and (iii) is not required to be used for backup capacity in the event that DIRECTV 4S malfunctions, then DIRECTV will have the *technical* capability with its combined fleet to serve 103 DMAs in late 2003 or early 2004. DIRECTV simply cannot serve 103 DMAs however: once again, the issue of technical capability is not meaningful unless it is considered in tandem with the economic realities of providing local channel service. At most, the DIRECTV 4S and DIRECTV 7S satellites will serve approximately 29 additional DMAs, or approximately 70 DMAs total, and DIRECTV may likely serve fewer DMAs.

Unless one of the planned satellites fails or suffers severe operational set-backs, a third spot beam satellite for either EchoStar or DIRECTV alone would not make business sense. The costs would far outweigh the benefits. Most importantly, another spot beam satellite would

require the sacrifice of scarce national programming spectrum, which would therefore require losing competitiveness nationally and forgoing significant revenue. The on-the-ground costs of additional local programming would also be significant, particularly given the smaller subscriber bases of independent EchoStar and DIRECTV. Without a merger, the gains for consumers from an additional satellite would not justify these costs.

If the merger is approved, New EchoStar will construct and launch another spot beam satellite, tentatively named NEW ECHOSTAR-1, which is planned to re-use 8 DBS channels at the 110° W.L. location. The "Local Channels, All Americans" plan will feature the new satellite operating in conjunction with the DIRECTV 4S, DIRECTV 7S, EchoStar VII and EchoStar VIII satellites, for a total of 28 spot beam frequencies, to collectively provide local broadcast channels to all 210 DMAs, with necessary back-up and service expansion capabilities. For each firm standing alone, such a plan would require a totally unrealistic sacrifice of dozens of channels of national programming, and would simply not happen. The merger is the only way to ensure local-into-local service for all of the United States.

Compression

Current compression and the predicted modest changes in compression are discussed in response to Interrogatories XII.B and XII.C.

MPEG-4

EchoStar and DIRECTV both use the MPEG-2 video encoding standard. Some merger opponents have suggested that a newer standard, MPEG-4, could increase the capacity of each company's DBS system. MPEG-4 is not practical for EchoStar and DIRECTV from a business perspective for several reasons. *First*, while MPEG-4 may offer significant capacity advantages over MPEG-2 at lower quality levels suitable for streaming over the Internet, it does not offer significant capacity advantages over MPEG-2 at the higher quality levels necessary for EchoStar and DIRECTV to compete with cable. Second, use of MPEG-4 would require new set-top boxes for each consumer. A system-wide swap-out of set-top boxes is not practical from a business perspective given the limited – if any – consumer benefits. Third, the swap-out would be particularly expensive because MPEG-4 compatible hardware is immature.

Modulation and Turbo Coding

EchoStar and DIRECTV currently use QPSK modulation. Other forms of modulation are available for conceivable use, including 8PSK modulation. A system-wide roll-out of 8PSK modulation is not feasible from a business perspective for several reasons. *First*, the older satellites in the EchoStar and DIRECTV fleets do not have the power to transmit 8PSK signals effectively. *Second*, even with satellites that are powerful enough to broadcast 8PSK effectively, the effective capacity gain is relatively small. *Third*, 8PSK would require new, more costly set-top boxes. A system-wide swap-out of set-top boxes and launch of new, higher-power satellites is not practical from a business perspective in light of the limited benefits of 8PSK modulation. More advanced modulation would suffer these same drawbacks to a greater degree.

Turbo-coding is a means to improve the effectiveness of the error-correction that are used to allow consumers to receive adequate signals even if the DBS signal suffers from some interference. If it worked properly, turbo-coding would thus allow more real content, and less error-correction overhead, on a DBS channel. In the end, however, turbo-coding would only offer a relatively small increase in capacity. Moreover, a system-wide roll-out of turbo-coding is not practical as it would require new set-top boxes for all subscribers, increase the cost of each box, and would only offer a relatively small increase in capacity.

As discussed in response to Interrogatory XII.H, EchoStar is evaluating 8PSK modulation and turbo-coding for use in providing HDTV service, and it may prove practical for that purpose, in light of several factors including: the large amount of bandwidth consumed by each HDTV channel; the fact that HDTV could be carried on newer, higher-power satellites; and the relatively small number of HDTV subscribers today, thereby limiting the numbers of customers who would need new set-top equipment.

H. The application states that set-top boxes will be changed. Is it the intent to improve efficiencies such as higher modulation techniques without change-out?

At least a significant subset of customers from either EchoStar or DIRECTV will require new set-top boxes in order to take full advantage of the full array of additional programming and services that the combined company will be able to offer. As explained in response to Interrogatory X.C, EchoStar and DIRECTV will decide on which of their technology platforms will be used by New EchoStar for its core programming. Those consumers that will no longer be able to receive the programming they receive at the time with legacy equipment will need New Equipment, which will be provided by New EchoStar. As part of the process for deciding upon the post-merger technology platform and working out the details of the post-merger transition, the companies are also currently examining whether it is feasible and economical for the new set-top boxes to include new technologies, such as 8PSK modulation and/or turbo coding, that currently are not used by either DIRECTV or EchoStar.

A number of issues make adoption of such new technologies difficult. First, only consumers with the new equipment would be able to receive programming taking advantage of the new technologies. Thus, at least initially, that programming would be available only to a subset of the combined subscribers of the company. In order to make the programming available to all subscribers, new consumer equipment would be required for all subscribers, not just for the existing base of one firm or the other. One potential way of gradually introducing such advanced boxes would be to offer new services only available to consumers with the new equipment, but that has the drawback of devoting scarce spectrum resources to programming with a necessarily limited audience. The costs of adding the new technologies may also be prohibitive.

EchoStar and DIRECTV are investigating those costs and attempting to find ways to make the deployment of such advanced boxes cost-effective.

I. Is it your intent to serve nation-wide from one location? If so, is it your intent to move the spot beam satellites to the orbital position where local-into-local would be? Would CONUS satellites be moved to the national location?

New EchoStar plans to offer consumers significantly expanded programming options, and it will not be possible for all of the national programming to be carried from one orbital location, due to the technical constraints on the number of programming channels that can be effectively squeezed into the authorized spectrum at each location. Accordingly, New EchoStar will not provide all national programming from one location.

However, the companies are considering plans whereby one orbital location would be the primary source for national programming. The two options being considered are to use either the 110° or the 101° W.L. orbital location primarily for the most popular national programming, although that location would still be used to serve some local-into-local programming. Final decisions in that regard will be made according to the process outlined in response to Interrogatory X.C. In any event, the combined existing and planned satellite fleets will provide sufficient capability to carry national programming from each orbital location, at least for all of the DBS channels that will not be used for spot beams to carry localized programming. New EchoStar currently intends to retain satellite fleets in each CONUS orbital location sufficient to use all 32 DBS channels, and to use all authorized DBS channels at each licensed non-CONUS orbital location.

J. What is the intended use for the orbital positions of 61.6 W, 148 W and 175W, since it appears that the entire country is served from central locations?

The Hughes Respondents incorporate EchoStar's response to this interrogatory by reference.

K. What do "o/e," "o" and "e" mean in the satellite deployment charts?

The "o/e," "o" and "e" references in the satellite deployment charts are abbreviations for "odd" and "even," and refer to the odd- and even-numbered DBS channelized frequencies.

L. How do plans for the integration of Spaceway/Wildblue/EchoStar systems affect the scale of manufacturing when current designs utilize different access/modulation/switching methods?

Approximately two thirds of the projected costs for consumer and enterprise Ka band terminals are associated with the RF transceiver and antenna. The remaining one third is associated with the satellite modem that is connected to the users' PC or LAN. SPACEWAY and potential EchoStar Ka band satellites can all leverage common antenna and transceiver technology. Even though the contemplated SPACEWAY system utilizes on-board processing and the other proposed or contemplated systems do not (they are bent-pipe configurations), there

is enough commonality in power levels and antenna gains/patterns to serve all systems with a single set of products/vendors. This means that the combined subscriber bases of these services will likely provide the scale necessary to reduce the RF-driven portion of the CPE costs to levels below that which any single service provider could achieve (in addition to all of the other scale economies detailed above).

EchoStar is separately addressing its minority interest in WildBlue.

M. Provide information on the time frame needed to implement these technical changes.

The Applicants are uncertain as to the "technical changes" to which this Interrogatory refers. To the extent that this Interrogatory refers to any changes that may be discussed in XII.L, please see the response to that Interrogatory. As noted in that response, substantial scale economies for common components of the various subsystems will be available without the need for any technical changes. To the extent that this Interrogatory refers to changes that may be made to set-top boxes, please see the response to X.F.

XIII. Information About Actual And Potential Competitors (To The Extent This Information Is Available)

A. For MVPD competitors, particularly cable systems, provide data by zip code or similar disaggregation detailing services offered (programming services, cable modem, and other services), number of subscribers for each service offering, and the prices charged for each type of service.

Attached as Schedule XIII.A. is a list of MVPD competitors by DMA. The list separates competitors in each DMA by major "MSOs" and minor "Other Competitors."

While Applicants do not possess comprehensive information about their competitors, attached as Schedule XIII.A.(i) is a chart that lists on a national basis the number of subscribers for each of the top fifteen MVPD companies. Schedule XIII.A.(i) shows this list pro forma for announced transactions and for the years 1998 through 2000. Schedule XIII.A.(i) also shows a summary of the number of channels and prices offered by certain C band programming providers for programming packages and a list of examples of C band programming options.

None of these schedules purports to be a complete list of Applicants' MVPD competitors.

B. For broadband services, provide data by zip code or similar geographic disaggregation regarding the types, number of, and capabilities of competing suppliers of broadband services.

1. For each geographic region, list all providers of broadband services that compete with your offerings, including one-way and two-way

cable modem service, DSL service and terrestrial fixed wireless service.

2. **For each of these providers, fully describe their offerings, including: download speeds, upload speeds, other services, pricing plans including installation charges and monthly fees, and equipment costs.**

3. **For DSL providers that compete with your service, indicate the share of television households in the geographic region that have access to DSL service.**

4. **For cable modem providers that compete with your service, indicate the share of households in the geographic region that have access to cable modem service.**

DSL and cable modem services are the closest competitors to Applicants' satellite broadband Internet services.

While Applicants do not possess comprehensive information about their competitors, Schedule XIII.B provides information from an industry analyst unaffiliated with HNS which includes the following information: (i) companies which HNS considers to be its top competitors in the provision of broadband Internet services, (ii) the type of broadband technology used by each such competitor, (iii) the estimated number of subscribers for each competitor at year-end 2001, (iv) the estimated market penetration of each competitor at year end 2001, and (v) the business addresses, websites, and phone numbers of each company. HNS does not maintain, in its regular course of business, data concerning the estimated sales or estimated market penetration of its competitors in the sale of broadband Internet services. HNS also does not maintain, in its regular course of business, data concerning the number of subscribers of its competitors in the sale of broadband Internet services, other than for year-end 2001.

Schedule XIII.B. also provides on separate tables a list of the broadband services offered by cable, overbuilder, telephone company, and MMDS providers.

None of these schedules purport to be a complete list of Applicants' competitors.

C. **Describe current and anticipated service offerings and rate plans for competitors that currently offer or are expected to begin offering satellite broadband services within the next two years.**

Schedule XIII.B also includes certain information regarding HNS broadband competitors.

D. **Provide any studies, analyses, assessments, or considerations in your possession that involve comparisons of current and future satellite broadband services provided by competitors.**

Applicants are responding to this document request separately from this response.

E. Identify the central requirements for entry into the provision of DBS and satellite broadband services, including, but not limited to, research and development, planning and design, equipment, distribution systems, patents, licenses, sales and marketing activities, and any necessary governmental approval. Also estimate the costs associated with these entry requirements and the amount of these costs that would be recoverable if the entrant were unsuccessful or elected to terminate its provision or sale of the service in question.

General

There are numerous possible ways in which an entrant may compete in the MVPD market or portions thereof, and any entrant in the MVPD market (*i.e.*, any firm that were to offer video services into the home) would likely compete with DBS. MVPD entry could be accomplished utilizing any number of technologies. New entrants have an advantage because they can add new technologies without having to bear switch-out costs or use additional spectrum for duplicative services during a transition period. Here is an illustrative list of MVPD providers and potential entrants:

- **Cable television operators.**

- **Cable overbuilders and terrestrial wireline Broadband Service Providers.** The Commission has recognized "the growing importance of providers that are overbuilding existing cable systems with state-of-the-art systems that offer a bundle of telecommunications services, including video, voice, and high-speed Internet access."[5] The Commission has termed these overbuilders "Broadband Service Providers" ("BSPs"), and noted that despite the challenges inherent in BSPs' strategy of entering markets with entrenched competitors, BSPs such as RCN and Knology are continuing to grow in terms of revenue and subscribership.[6]

- **BellSouth, Qwest and other Incumbent Local Exchange Carriers** are deploying fiber to the curb and VDSL technology and have achieved

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5 Annual Assessment to the Status of Competition in the Market for the Delivery of Video Programming, Eighth Annual Report, FCC 01-389 (rel. Jan. 14, 2002), at ¶ 13 ("Eighth MVPD Competition Report").

6 *See id.* at ¶¶ 109, 111.

critical mass in several cities.[7] Such systems can offer virtually limitless video and interactive bandwidth.

- **Electric and gas utilities** are also moving forward with ventures involving video distribution. The Commission has noted that although the utilities are "not yet major competitors in the telecommunications or cable markets," characteristics of these entities, "such as ownership of fiber optic networks and access to public rights-of-way, could make them competitively significant."[8] Importantly, utilities appear to hold great promise for competition in rural areas, as the Commission observed that "utilities, particularly some municipal utilities in rural areas, are willing to build advanced telecommunications networks offering a full range of services where incumbent cable operators and telephone companies are not."[9]

- **Wireless cable providers**, including licensees in the **Multichannel Multipoint Distribution Service ("MMDS") and Local Multipoint Distribution Service ("LMDS")**. Terrestrial services such as MMDS are capable of serving an estimated 36 million homes. Although MMDS subscribership remained steady in the past year, the competitiveness of MMDS video offerings will likely be enhanced by MMDS operators' roll out of high-speed Internet access service, which can be paired with video to create the type of bundled service offering that consumers increasingly find attractive.

- **The new Multichannel Video Distribution and Data Service ("MVDDS")**, another wireless cable application. The Commission has reported that it is "technically feasible" for that service to share spectrum allocated to DBS in the 12.2-12.7 GHz band. The Commission has adopted a Further Notice of Proposed Rulemaking seeking comment on technical and service rules for licensing the new services. Four companies, Northpoint Technology, MDS America, Satellite Receivers, Ltd. and PDC Broadband Corporation have sought licenses or otherwise expressed interest in providing such a service. While EchoStar and DIRECTV have opposed the interference levels posited by proponents of

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7 *See id.* at ¶¶ 100, 103 (while certain ILECs have exited the video business, others, such as Qwest and BellSouth, continue to pursue deployment of MVPD services).

8 *See id.* at ¶ 104.

9 *See id.*

MVDDS, they have also stated on the record that competition from such services is welcome so long as no interference occurs.[10]

- **NRTC and its affiliate Pegasus** will also likely compete against New EchoStar by using certain facilities of the combined entity if they desire to do so. Specifically, to the extent that DIRECTV's contract with NRTC grants NRTC the right to distribute certain video programming in certain areas, the merger would not alter its contractual rights. Since NRTC and Pegasus would not in those circumstances be constrained by New EchoStar's national pricing commitment, they would be able to continue to charge more to rural subscribers, as they do now, than DIRECTV or EchoStar, separately or together. In fact, however, the DIRECTV/ NRTC agreement makes clear that NRTC's *exclusive* rights are limited and will expire in the future. As a consequence, New EchoStar will be able to compete fully with NRTC/Pegasus throughout those areas where NRTC and Pegasus have distribution rights under their contracts. This may in turn mean that, for commercial reasons, NRTC and Pegasus no longer will be able to charge more than New EchoStar for the same service, but such a result would be a benefit, not a loss, for rural consumers.

- **DBS service from orbital locations allotted by the International Telecommunication Union to other countries.** A new entrant may offer DTH service by obtaining licenses to utilize, or by arrangement with firms controlling, non-U.S. orbital locations. Two companies, Digital Broadband Applications Corporation and World Satellite Network, Inc. ("WSNet"), have applications pending at the FCC to offer service to the U.S. from Canadian orbital locations. Similarly, Mexico and Argentina have reached agreements with the United States, whereby satellites from these countries' DBS and FSS orbital locations could provide satellite services to U.S. consumers subject to the same FCC licensing

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10 *Cable and Satellite Broadcast Competition: The Status of Competition in the Multi-Channel Video Programming Distribution Marketplace Before the House of Representatives Energy and Commerce Committee, Subcommittee on Telecommunications and the Internet* (statement of Charles Ergen, Chairman and CEO, EchoStar Communications Corporation) (Dec. 4, 2001) ("While EchoStar does not oppose the emergence of new competitors in the MVPD market, we are opposing the proposal by Northpoint, because Northpoint's current proposal would cause electrical interference with the satellite reception of our established satellite TV customers as confirmed by the MITRE Corporation's testing."); *see also* Comments of EchoStar Satellite Corporation in CS Docket No. 99-250 (Aug. 16, 1999) at 1, 3 ("EchoStar welcomes new entry into the MVPD market and applauds the Commission's proposal" to open the 12.7 – 13.2 GHz band for use by all MVPD providers... [T]he Commission should consider this band as yet another possible home for the service planned by Northpoint Technology.")

requirements that apply to the U.S. DBS orbital slots. Other Latin American countries also have FSS orbital locations with the potential to serve American viewers with direct to home satellite services. While these international DBS slots are subject to various regulatory restrictions (such as foreign ownership and programming content limitations), these constraints are more or less significant depending on the company contemplating their use.

- **DBS service from other U.S. DBS orbital locations**. Non-full CONUS licensees, such as R/L DBS and Dominion, also will pose a competitive threat to New EchoStar. R/L DBS has proclaimed its ability to serve nearly every corner of the United States with regional programming from the 61.5° W.L. orbital location. R/L DBS is bound by the terms of its permit to commence service by December 2003. It reports that it will use next-generation technology, including spot beams and high-compression algorithms. This adds up to a potential strong competitor against existing DBS licensees. Dominion Video Satellite, d.b.a. Sky Angel, is also authorized to operate 8 DBS frequencies at the 61.5° W.L. locations.

- **Ka band service**. MVPD competition could be brought to bear by any number of Ka band licensees. Pegasus, for example, is free to use its valuable Ka band licenses to provide MVPD service throughout the United States. Far from the dire picture of spectrum warehousing painted by opponents of the merger,[11] there is wide dispersion of Ka band and other FSS licenses among a variety of licensees. In fact, of the full CONUS Ka band and FSS orbital locations (those from 83° W.L. to 133° W.L. according to Pegasus),[12] licensees other than New EchoStar would hold a majority of the assets. Eleven other entities affiliated with neither EchoStar nor Hughes currently control orbital slots in the 83° W.L.-133° W.L. arc, which demonstrates that there are more than enough prime Ka band slots controlled by others to ensure that the merger will not "stifle" competition in providing broadband services.

- **C band services** are also maintaining efforts to attract rural subscribers. While C band is certainly not an effective alternative in urban areas, it should not be discounted as an alternative in rural areas. NRTC itself is a major distributor of C band service even as it resells DBS service. While acknowledging that the number of C band subscribers has fallen over the past few years, PrimeTime 24, the self-proclaimed "leading provider of network television programming to the C band marketplace," claims that, as of November 2001, there were almost 900,000 C band subscribers in

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11 NAB Petition at iii, 11-12; Pegasus Petition at 63-69; NRTC Petition at 50-56.

12 *See* Pegasus Petition at 71.

the United States. Motorola is currently marketing its digital "4DTV" product with up to 500 channels.

- **Medium-power FSS satellites** still lend themselves to various DTH initiatives, as shown for example by BellSouth's recent plan for a DTH offering. While BellSouth has not gone forward with that plan, the fact remains that ample FSS spectrum remains available for medium-power and high-power satellite DTH initiatives. The recently announced DTH plans of Television & Radio Broadcasting Services ("TARBS") are another good example of this type of possible entry. TARBS plans to broadcast more than 50 channels of multicultural TV programming direct to consumers' homes by leasing C and Ku band transponder capacity on the Galaxy 10R satellite.

- **Other satellite initiatives** include WSNet, which provides satellite service to private cable and wireless providers, offering over 180 digital video, music, movie and pay-per-view channels. In conjunction with AT&T's Headend -In-The-Sky ("HITS"), another satellite supplier to cable and wireless cable operators, WSNet is now offering a program that allows smaller cable operators an opportunity to offer digital direct broadcast satellite to their customers, using dishes and receivers for medium power Ku band satellites. This is a low cost model because the satellite and cable assets are already in place, and WSNet can use the marketing and distribution capabilities of existing companies (*e.g.,* rural cable companies) to market the product, including to consumers unserved by the cable firms' wireline offerings. WSNet offers the same or a similar product to residents of Puerto Rico in partnership with a large consumer electronics chain on the island. Canadian satellite companies such as ExpressVu and Shaw provide similar services in Canada and should be counted as potential entrants for the U.S. MVPD market. In addition to its Vu! pay per view service, ExpressVu has been allowed by Canadian regulators to operate a national satellite distribution undertaking providing satellite services to smaller cable companies in Canada. Shaw has acquired control over the former Star Choice service and has similar authorizations.

- **Expansion DBS spectrum**. The FCC recently allocated additional "expansion" spectrum for DBS operators in the 17 GHz band starting in 2007.[13] This allocation was made in conformity with the corresponding

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13 *See Redesignation of the 17.7-19.7 GHz Frequency Band, Blanket Licensing of Satellite Earth Stations in the 17.7-20.2 GHz and 27.5-30.0 GHz Frequency Bands, and the Allocation of Additional Spectrum in the 17.3-17.8 GHz and 24.75-25.25 GHz Frequency Bands for Broadcast Satellite-Service Use*, 15 FCC Rcd. 13430, 13475-77 (2000); *see also Redesignation of the 17.7-19.7 GHz Frequency Band, Blanket Licensing of Satellite*

ITU Region 2 allocation, although the Commission allocated only 400 MHz to the BSS whereas the Region 2 allocation is for 500 MHz. *See* ITU Radio Regulations Footnote S5.517.

Following is a discussion of some elements of entry, and the costs associated with them. Potential entry may well be in specific types of service and/or specific geographic regions.

Entry Into the MVPD Market – DTH Service

Satellites. In general, the rule of thumb in the MVPD industry is that it would cost approximately $250 million and take approximately 2-3 years to design, build, insure, and launch a new DBS satellite. A number of commercial vendors have experience in satellite construction. Loral, Lockheed Martin and Boeing have built satellites for EchoStar and DIRECTV. Other U.S. and foreign manufacturers are capable of building DBS satellites. A new satellite could include spot beaming capability to gain geographic reuse of some frequencies to allow for more local or regional programming.

Alternatively, or in addition to constructing a new satellite, a new entrant might be able to buy an existing satellite that is partially constructed. At any given time, there may be on-ground satellites for sale or potentially available, because, for whatever reason, plans or funding for the satellite have fallen through. A new entrant might be able to use one of these partially completed satellites as a basis for construction of a new DTH system, and thus save considerable time and money.

If the new entrant were unsuccessful, some portion of the value of the satellite could be recovered by selling it to another current or potential DBS provider. If the satellite were not yet launched, it might be convertible to other uses and/or sold on the global market. If the satellite were in orbit, the pool of potential buyers would be smaller.

A new entrant could also enter the direct to home satellite business, or segments thereof, by leasing transponder space on an existing satellite, rather than constructing its own satellite. A number of firms, including Loral, Lockheed Martin, PanAmSat, and SES Americom, offer for lease transponder space on their geostationary satellites that could be used to provide medium power Ku band or C band satellite television service to residences in the United States. The costs of leasing transponder space vary. A rough estimate is that it would cost approximately $2 million per year to lease one CONUS transponder (subject to availability) to carry a medium power Ku band signal. One transponder would enable an entrant to broadcast approximately 10 channels of programming across the continental United States. An example of this approach is Dominion Video Services, d.b.a. Sky Angel, which leases bandwidth from EchoStar in order to provide DBS service to its customers. It may also be possible for a firm

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Earth Stations in the 17.7-20.2 GHz and 27.5-30.0 GHz Frequency Bands, and the Allocation of Additional Spectrum in the 17.3-17.8 GHz and 24.75-25.25 GHz Frequency Bands for Broadcast Satellite-Service Use, Notice, 13 FCC Rcd. 19923, 19959, n.116 (1998).

already in another aspect of the satellite market to expand its offerings to MVPD consumers without the need for launching a new satellite.

Because of limited transponder space and the difficulty of integration, it would be difficult to offer a broad array of programming by using leased satellite transponders. However, an entrant could offer a low-priced basic service with a smaller number of channels that might be attractive to some consumers. As previously indicated, WSNet and AT&T's HITS currently provide satellite service to cable and wireless providers that allows them an opportunity to offer digital service to their customers, using a 27-inch dish and receivers for medium power Ku band satellites. Motorola's C band participation with its digital "4DTV" product also offers up to 500 channels of programming.

Encoding and Uplink Facilities. A new entrant would need to build a set of compatible equipment for its own uplink and encoding facilities. The equipment necessary to receive signals from programmers, usually sent by FSS satellites, is commercially available from several vendors. If the new entrant chose to offer local-into-local programming, it would need to construct or lease facilities in the local DMAs served to collect the signals from the local broadcast stations. Those signals could then be transmitted either by digital data lines or by FSS satellite, and the means for both are readily available on the open market. The equipment to compress, encode, multiplex, and modulate the digital signal is commercially available from multiple vendors. The equipment necessary to transmit the signal to the satellite is also commercially available from many vendors. The costs of the entire set of equipment necessary to gather, process, encode and send a signal to a satellite would depend on numerous choices in capabilities. If the entrant were to fail, some portion of the value of the equipment might be recoverable by reselling the equipment.

Subscriber Acquisition Costs. In order to enter the MVPD market, a DBS provider must establish (whether through its own facilities or by relationship with an established or new vendor) the ability to manufacture and deliver the necessary customer premises equipment to end users. Acquiring subscribers in the DBS business has historically required subsidization of the consumer premises equipment and other costs (*e.g.*, because the target market is comprised largely of cable subscribers who are unlikely to switch if doing so requires a significant up-front investment). Subscriber acquisition costs are generally comprised of two main components: (a) subsidies to retailers and manufacturers designed to reduce the price of equipment to the consumer; and (b) subsidized sales and marketing expenses.

Customer Premises Equipment. A consumer needs two basic pieces of equipment (in addition to a television set) to receive and translate a satellite signal: an antenna or "dish" and a receiver or "set-top box." There are many electronics equipment manufacturers capable of producing such equipment, including Thomson Consumer Electronics, JVC, Philips, SCI and others. A new entrant could choose to follow the EchoStar model of contracting with an equipment vendor to produce the equipment, with EchoStar selling the equipment to retailers and consumers, or the DIRECTV model of licensing third party manufacturers to manufacture and sell DBS equipment under their own name. The cost of set-top-boxes varies depending on the level of technology included in the box. For example, EchoStar's top line receivers include hard

drives for recording and playing back broadcast material. A global organization, Digital Video Broadcasting, has developed a set of standards for digital equipment that have been used by numerous companies, including EchoStar and DBS firms in Europe and Asia.

The other major cost associated with consumer premises equipment is installation. Average installation costs for a high-powered DBS system are approximately $150 per consumer installation, although a certain percentage of the prospective customer base could self install their dish, wiring and equipment. Installation cost for the larger medium power Ku band dishes and receivers would be slightly higher. Costs of installing a C band dish are about $550 per installation. To the extent that installation must be subsidized, it would be considered a cost of entry.

Distribution, Marketing, and Installation. A new DTH firm would have to select its distribution and marketing approach. At one end of the spectrum, the firm could develop a national or regional marketing system for selling directly to consumers. At the other end of the spectrum, a new entrant could partner with existing firms to market and distribute their system. For example, a new entrant could partner with local telephone companies or utility companies, who have established relationships with potential customers, which would reduce the costs an entrant would need to incur to acquire subscribers. A company could also develop relationships with retailers to sell its products and services. For example, when WSNet began providing satellite television service in Puerto Rico, it partnered with a large consumer electronics retailer on the island. A new entrant could also use direct marketing. The investment required to establish the necessary distribution and marketing infrastructure depends greatly on numerous variables. However, it would likely be possible for a new entrant to establish a marketing system with limited up-front costs by making per-system and residual payments. These payments would not be recoverable if the entrant was unsuccessful, but future payments would likely not be required.

Patents. As with any sophisticated electronic technology, a number of firms hold patents that could potentially be implicated in manufacturing DBS equipment or providing DBS service. Generally speaking, the necessary technology can be developed independently or licensed on commercially reasonable terms, although several firms have asserted patent infringement claims against EchoStar and DIRECTV in connection with certain DBS technology. Both companies believe, however, that none of these claims has merit, and even if upheld in court, they should not block a new entrant in the provision of DTH service.

Programming. In order to offer MVPD service, a new entrant would need to license existing programming or create its own programming. While there are a number of programmers who offer programming content at a reasonable rate, much of the "crown jewel" programming that consumers demand is controlled by a limited number of companies. In fact, the top five programmers account for approximately 75% of the programming costs of the average MVPD provider. Programming costs are a significant part of the costs of any MVPD provider.

Regulatory Licenses. In order to offer DBS or DTH service in the United States, an entrant would need either a license from the FCC, or make some arrangement with a firm that holds a license with the FCC.

Entry Into The Broadband Market

Entry into the broadband market through a satellite platform is more difficult than it is for video service: among other things, the technology is newer and untested and the service is more bandwidth-intensive. Here too, however, there is ample spectrum available: the Commission has issued many Ka band satellite licenses that can be used to provide satellite-based Internet access service. A number of well-financed ventures aggressively sought these Ka band licenses and took steps towards implementing these services. Given the current uncertain economic environment, and the fact that demand for broadband Internet service in general has not matched its original projections, virtually all of these firms have scaled back from their original plans. Several of these firms were forced to postpone or cancel their plans. Nevertheless, these firms' licenses, for the most part, remain current, and a number of them have the wherewithal to make the substantial investment in satellite broadband if they determine that they can be successful.

As a general matter, a primary requirement for entry into the satellite broadband market is access to a large potential customer base within a reasonable period of time. As discussed in more detail below, the fixed costs of originating and providing service over a broadband satellite platform are substantial. EchoStar and Hughes believe that they would need to attain at least 5 million subscribers within a five-year period to justify the significant up front investment and subscriber acquisition costs associated with actually marketing and deploying a new, ubiquitous two-way broadband service to consumers in the Ka band.

Satellite broadband entry can be achieved through the deployment of a firm's own two-way satellite network, through the lease of two-way transponders from another satellite operator, or through the provision of hybrid service from one-way satellite downlinks and terrestrial return paths (*e.g.*, dial up modem).

1. Deployment of Satellite Two-Way Networks

A company could enter the satellite broadband market by building and launching its own geostationary orbit ("GSO") or non geostationary orbit ("NGSO") satellites. Under standard industry practice, it generally takes two to three years to design, construct and launch a typical GSO satellite; however, Ka band satellites may take longer to deploy due to the application of the technology commercially for the first time. Although the cost of a satellite designed for Internet access can vary considerably, depending on the frequency band and whether the satellite includes more complex technology, such as spot beams and on-board processing, a rough estimate of the cost to design, build, launch, and insure a Ku or Ka band GSO satellite for Internet access is between $350 million and $700 million. Multiple GSO satellites are required, however, for such a consumer service in order to provide the necessary backup facilities in case of an in-orbit failure and to enable the provider to reach a critical mass

of subscribers. NGSO systems require a larger number of satellites in order to deploy a fully operational network of satellites that can provide continuous coverage of the United States. Depending on the orbit – low Earth versus medium Earth – anywhere from 10 to 844 NGSO satellites have been proposed by system proponents. While the costs of individual NGSO satellites generally are less than GSO satellites, overall NGSO system costs tend to be substantially higher due to the numbers of satellites involved. A number of commercial vendors, including Loral, Lockheed Martin, Boeing, and others, possess experience in this business.

Hughes's current plan for its SPACEWAY broadband program is to construct and launch three specially designed GSO satellites for Internet access and other broadband services. Deploying the SPACEWAY system requires an initial capital expenditure in excess of $1.8 billion, and the development of complex technology that has never before been deployed in a commercial satellite network.

Each of the three SPACEWAY spacecraft is designed to utilize 500 MHz of spectrum (19.7 - 20.2 GHz downlink; 29.5 - 30.0 GHz uplink), and, depending on the quality of service levels and the amount of bandwidth capacity demanded by business and consumer customers, could serve business users and up to **[Redacted]** U.S. consumers. This satellite is optimized for broadband services. In order to support these large expenditures and mitigate the attendant risks, the Hughes business plan assumes a rapid growth in users, and primarily targets enterprise customers. Because Hughes has an established VSAT business clientele, it is better situated to secure this business than an entrant without such relationships and expertise. Hughes also has targeted these customers because they present a greater opportunity to generate additional revenue, they are not as cost sensitive as residential users to up front costs of acquiring equipment, and they are familiar with the requirement of professional installations.

A satellite broadband service provider also needs at least one and possibly several large uplink/downlink facilities to connect the terrestrial Internet backbone to the satellite network. A spot beam satellite could require anywhere from 4 to 12 of such large interconnection facilities depending on the satellite configuration. Each such facility could cost anywhere from $1 million to $5 million.

A satellite broadband consumer needs an antenna to send and receive the signal, a transceiver to amplify and decode the signal, and a satellite modem to translate it. Many electronics equipment manufacturers are capable of producing such equipment. A new entrant could contract with an equipment vendor to manufacture the equipment and resell that equipment to consumers and retailers under its own name. This is the approach employed by StarBand. Alternatively, a new entrant could license third parties to manufacture and sell the necessary equipment under their own brand names. For Ku band equipment, the median combined cost of the transceiver/modem and other components is currently around $750, depending on the type of CPE. As noted in Section IX.E., Ka band equipment costs initially are expected to be substantially higher than Ku band CPE. However, the Applicants expect the proposed merger to help drive these costs down over time. In order to price equipment at a level that consumers will accept in the current competitive environment, the new entrant would likely have to subsidize a portion of the equipment and installation costs for each residential subscriber.

In addition to the costs of satellite infrastructure and subscriber equipment, any entrant is likely to incur substantial subscriber acquisition costs in order to acquire enough new subscribers to make its investment worthwhile. These costs include sales and marketing expenses as well as equipment and installation subsidies. While it is difficult to estimate precisely, it is anticipated that the costs of actually marketing and deploying SPACEWAY services to consumers will require a significant additional investment far beyond the $1.8 billion of capital costs for the SPACEWAY system. Particularly in the current economic climate, it would be very difficult to obtain funding for the significant cash resources needed to acquire consumer subscribers. Such an investment makes sense only if the costs of acquiring consumers are at a level that is sustainable by the expected revenue stream from those consumers, taking into account anticipated subscriber churn. Moreover, the subscriber acquisition costs for such a large customer base will consume significant cash resources which Hughes alone has a very limited financial ability to provide and the merged entity will be better able to provide.

A new entrant in the provision of satellite broadband services to consumers would need to promote its offering through various means, such as advertising on the Internet, print and broadcast media, direct marketing and point of sale displays at equipment resellers. Alternatively, the new entrant could avoid or defray the direct cost of sales and marketing by entering a cooperative sales arrangement with established national or local ISPs or DSL providers. Such an arrangement, however, would most likely result in increased commissions having to be paid for signing up customers.

There are two elements to distribution of satellite broadband service: distribution of the equipment necessary to receive the service, and distribution of the service itself. With respect to equipment, potential distribution channels include DBS and C band dish dealers, consumer electronics stores, and direct-to-consumer sales through the Internet or direct mail. Dealer commissions for sales of equipment will vary widely, but can be expected to fall roughly between $150 and $300. In addition, the antenna requires professional installation. This could be accomplished through the dealer or store, through technicians certified by the broadband provider, or by the new entrant itself. Installation costs for a consumer installation most likely would be approximately $150 to $200. For a business system, the cost could be much higher depending on the height of the building, number of connected computers, and other factors.

The new entrant could also distribute the service by partnering with established Internet service providers, selling the service through retailers who also offer the equipment, or simply selling the service itself. Telephone companies who want to offer a broadband option where they do not offer DSL are also possible candidates for cooperative sales arrangements. Establishing these or other relationships would be an important element of entry.

Although a number of firms hold patents that could be implicated in manufacturing satellite broadband equipment or providing satellite broadband service, generally speaking, the necessary technology should be able to be developed independently or licensed on commercially reasonable terms.

To launch and operate a GSO or NGSO satellite system in the United States in the Ku or Ka band, a new entrant would need a FCC license, or partner with or lease capacity from a firm that had such a license. Companies with Ku band licenses include SES Americom, Loral Skynet, Lockheed Martin, and PanAmSat. In addition to Hughes and EchoStar, a number of companies were awarded licenses for Ka band orbital slots, including Lockheed Martin Corporation, DirectCom Networks, CAI Data Systems, Inc., TRW, Inc., Pegasus Development Corporation, CyberStar Licensee LLC, SES Americom (formerly GE American Communications, Inc.), Astrolink International, NetSat 28 Company, LLC, Motorola, Inc. (application to transfer to Teledesic Corporation pending), Loral Space & Communications Corporation, Pacific Century Group, Inc., KaStarCom World Satellite, LLC (now controlled by Wildblue), PanAmSat Corporation, and WB Holdings 1, LLC. None of these firms has yet launched a Ka band satellite. The venture that seemed to have made the most progress before abandoning its efforts was Astrolink. The Astrolink joint venture to offer Internet broadband via Ka band satellites was backed by Lockheed Martin Corp, TRW, Telecom Italia, and Liberty Media among others. According to published reports, Astrolink believed that it would require a total investment of $3.7 billion to $4 billion to launch its service, with Lockheed investing $400 million, Liberty Media investing $425 million, and TRW and Telecom Italia each investing $250 million. This venture apparently was unable to raise further funding due to investor uncertainty about the prospects for satellite broadband service as a viable business. See "Joint Venture Backed by Lockheed Group Is Expected to End Satellite Investment," *Wall St. Journal*, October 30, 2001. It was further reported that Astrolink reported that it had terminated its Ka band spacecraft contract with Lockheed Martin, after having built 90% of the first spacecraft, and after having spent about $710 million on its Ka band system. *See* "Decision Nears on Astrolink as Lockheed Ends Funding, *Communications Daily*, Nov. 1, 2001. It is unknown whether anyone will proceed with the development of these Astrolink assets.

2. Entry by Leasing Transponders

StarBand, in which EchoStar is an investor, offers Ku band Internet service by leasing **[Redacted]** transponders on two Ku band satellites. (EchoStar markets, on a non-exclusive basis, StarBand's products in the United States.) Hughes' DIRECWAY service offers a similar service by leasing capacity on five Ku band satellites. Although EchoStar has publicly stated that it does not believe that leasing Ku band satellite transponders is a profitable long-term solution for satellite Internet access, another firm could seek to enter using a similar model.

A number of firms currently lease FSS Ku band CONUS transponders on GSO satellites, which could be used to provide broadband service to consumers. The cost of leasing Ku band transponders varies, but a rough estimate of the cost to lease a FSS Ku band CONUS transponder is $2 million per year. The number of subscribers that can be supported by such a transponder is primarily a function of transponder loading capacity, user demand, and the desired data transmittal rate. Information about the number of subscribers on Ku band transponders is provided in response to Interrogatory IX. Because CONUS beams reach the entire U.S., even a small entrant would have the technical ability to serve most of the United States. At present, there is limited availability of CONUS transponders in the Ku band. It may also be possible to lease Ka band capacity from another licensee. For example, Wildblue is leasing Ka band transponders from Telesat Canada.

For an entrant that sought only to lease transponders from an existing satellite provider, no FCC licenses would be required. The firm that owns and operates the satellite would be the FCC licensee. As discussed above, a variety of firms have licenses to operate FSS Ku band satellites that could be leased to deliver broadband service in the United States.

3. Entry Using Hybrid Satellite and Dial-up Service

Frontline Communications and DirecPC are examples of hybrid satellite and dial-up services in which the subscriber uses a narrowband (dial-up) connection for uplinks, and a satellite for downlinks. As with Ku band and Ka band, this method of entry requires use of satellite transponders, but entails less complexity since the satellite transmission is only one way.

However, one-way satellite Internet access is inferior to two-way service in a number of respects: Most notably, the uplink speeds are slower and the service ties up a phone line. On the other hand, a one-way receiver is less expensive than a two-way transceiver, and the service is on the whole faster than ordinary dial-up Internet service. The costs of entry are otherwise not significantly different from two-way broadband service except that more users can be served per transponder.

XIV. Post-Merger Plans

A. Provide detailed explanations of post-merger plans for video programming and other services, sales and marketing, pricing, retail distribution and customer service.

With the spectrum efficiencies gained by eliminating duplicative programming between EchoStar and DIRECTV, New EchoStar will significantly enhance its video programming offerings. First, by utilizing spectrum efficiencies and existing and planned satellites in conjunction with the launch of a new spot beam satellite, New EchoStar will serve all 210 DMAs with local broadcast service, as detailed in the New EchoStar 1 satellite application filed concurrently with the Applicants' Opposition and Reply Comments. Second, New EchoStar will be able to expand its offerings of national networks, particularly niche services such as foreign language programming and other content that traditionally has not gained carriage on cable systems. Third, spectrum efficiencies will allow for expanding the number of HDTV programming channels from the 2-3 channels offered today to 12 or more channels (HDTV channels require approximately 8 times the bandwidth of an ordinary digital channel).

With respect to other services, spectrum efficiencies will translate into new interactive services. These likely will include near video on demand, games, educational interactive programs, television commerce, and other services which create a two-way interactive television experience. Such services become more feasible with the advent of additional spectrum capacity, and by virtue of its roughly doubled spectrum capacity, New EchoStar will be able to implement interactive services while simultaneously carrying more

traditional video services. In addition, New EchoStar will be able to offer bandwidth-intensive applications such as telemedicine, particularly relevant to the rural subscriber base.

With respect to broadband services, as explained in more detail above, the merger will allow the deployment and marketing of an acceptable-risk, full-fledged consumer broadband service that can vie for a critical mass of residential subscribers. Simply stated, it is not reasonable, as separate companies, to expect to obtain financing for a satellite broadband service catering primarily to consumers on a large scale. The merger will make such a project sensible from the business perspective because of the larger pool of DBS subscribers that the combined company can seek to attract, the lower risk, substantial manufacturing cost savings, other economics of scale and higher rate growth associated with that larger subscriber pool, and other significant cost savings for uplinks and other infrastructure.

The Applicants currently are developing detailed plans for consolidating the sales and marketing operations of the two companies. New EchoStar will reap cost savings by combining such operations, eliminating redundancies wherever possible, and utilizing the best operating units and employees offered by the combined pool of resources. Similarly, customer service operations will be consolidated wherever possible, although New EchoStar probably will not be able to realize as many efficiencies in this category as others, since the number of subscribers per customer service representative generally remains fixed. The combined company will also secure advertising economies, as it will be able to spend fewer dollars per subscriber than each company today.

The Applicants anticipate that they will be able to reduce subscriber acquisition costs by marketing to a combined subscriber base, reducing the cost of subscriber equipment through economies of scale, and continuing the trend to direct marketing to consumers and selling via the Internet and over the telephone. Also, the improvements to the DBS product by the addition of local channels, more HDTV, and the other new and enhanced programming and services, provide retailers with increased benefits and related increased incentives to seek DBS relationships and to promote DBS sales.

With respect to the retailer arrangements, New EchoStar intends to keep current retailer arrangements in place. Competition among retailers always has yielded attractive value for consumers, particularly in rural areas where retailer-to-retailer competition has ensured not only high value, including installation and equipment surveys, but also superior customer service for consumers. In addition, New EchoStar expects the trend toward direct sales, particularly via the Internet, to continue unabated, helping to reduce subscriber acquisition costs.

Also, with the opening of spectrum, New EchoStar anticipates that it will able to increased opportunities for revenues from interactive programming and services such as pay-per-view, shopping, "jukeboxes" and games.

In keeping with the past practices of both EchoStar and DIRECTV, New EchoStar will continue to price competitively in order to vie for cable customers. Finally, the Applicants fully expect that they will be able to stem the current disconcertingly high rate of growth in programming costs and to bring it down closer to general inflation rates.